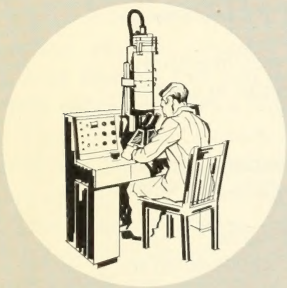
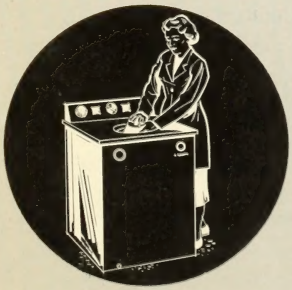
the National Animal Disease Laboratory

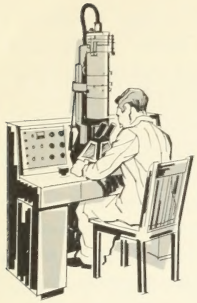




MAJOR ACCOMPLISHMENTS OF FEDERAL ANIMAL DISEASE RESEARCH

1885	Isolation of the *Salmonella* organism.
1886	Demonstration that vaccines made from killed cultures (bacterins) protect animals against some bacterial diseases.
1893	Discovery of cause of Texas fever and the role vectors play in spreading infectious diseases.
1898	Discovery of difference between human and bovine tuberculosis organisms.
1904	Discovery of the cause of hog cholera.
1907	Development of hyperimmune serum to prevent hog cholera.
1914	Discovery of cause of brucellosis in swine.
1921	Use of carbon tetrachloride to control hookworms in animals and man.
1922	Discovery of relationship between brucellosis organisms that cause the disease in cattle, swine, and goats.
1929	Development of a field test to detect pullorum disease in poultry.
1930	Development of Strain 19 vaccine to prevent brucellosis.
1935	Development of crystal violet killed vaccine to prevent hog cholera.
1949	Discovery of variant hog cholera virus.
1951	Development of practical test to differentiate between foot-and-mouth disease, vesicular stomatitis, and vesicular exanthema.
1952	Discovery of cause of hyperkeratosis of cattle.
1953	Identification of vibriosis as the principal cause of infertility in cattle in the United States.
1955	Identification of new fowl cholera organism.
1955	Demonstration of value of systemic drug against cattle grubs.
1957	Development of vaccine to prevent fowl cholera.
1958	Discovery of cause of rhinotracheitis of cattle.
1959	Isolation of a virus that causes the shipping fever complex.
1960	Discovery that foot-and-mouth disease virus can be reactivated after boiling.
1960	Development of test to differentiate between African swine fever and hog cholera.

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C. - Price 20 cents



the National Animal Disease Laboratory

The National Animal Disease Laboratory at Ames, Iowa, is the U.S. Department of Agriculture's research center for the study of livestock diseases that occur in the United States.

Here in the world's most modern veterinary research facility, scientists are seeking ways to conquer the infectious animal diseases that rob American livestock producers of $1.4 billion each year.

This Federal laboratory's ultimate goal is a livestock population as nearly free as possible from disease. When diseases are banished, healthy cattle, hogs, poultry, sheep, and other livestock will supply the Nation with more food and fiber at lower cost.

But diseases cannot be eliminated without knowledge. For this reason, the National Animal Disease Laboratory's primary work is to conduct basic and applied research on the infectious animal diseases prevalent in the United States. The laboratory's built-in safety features permit the study of about 25 different animal diseases at the same time.

About 20 percent of the center is used for regulatory activities. This work includes setting standards and testing veterinary biologics for safety and potency, and providing diagnostic services to support Federal eradication and control programs.

Both the research and regulatory activities are conducted by USDA's Agricultural Research Service (ARS).

The $16.5 million Ames laboratory is one of the Department's three principal research centers devoted to animal health. Others are the Plum Island (N.Y.) Animal Disease Laboratory, for the study of foot-and-mouth disease and other foreign diseases not now established in the United States; and the Parasitological Research Laboratory at Beltsville, Md., for the study of parasites that infest livestock. All three facilities are part of the ARS Animal Disease and Parasite Research Division (ADP).

Two regulatory divisions of ARS also are associated in the day-to-day work of the Ames laboratory. These are the Animal Inspection and Quarantine Division, which tests biologics; and the Animal Disease Eradication Division, which directs the diagnostic work. ADP is responsible for the laboratory's administration.

Staff

The laboratory employs about 500 persons. A director, an assistant director for research, and an assistant director for regulatory activities head the administrative staff.

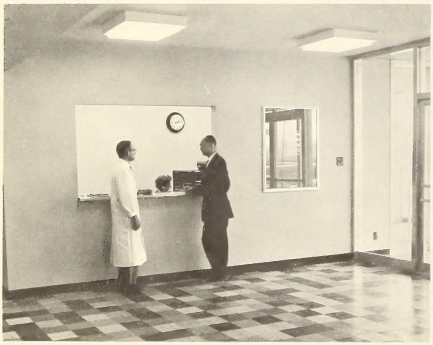
One-fifth of the staff are scientists—research veterinarians, bacteriologists, biochemists, physicists, and other biological scientists. A number of laboratory assistants and technicians are employed.

An engineer is in charge of operation and maintenance of the center, which requires as many utilities and services as a small city. Maintenance and service crews include electricians, air-conditioning specialists, plumbers, and carpenters. Animal caretakers and animal handlers work directly with livestock used in experiments. Among the many other employees are a glass blower, a photographer, farm helpers, dishwasher operators, and laundry workers.

Many of the laboratory's senior scientists were engaged in animal disease research for the Department of Agriculture at Beltsville before the Ames laboratory was opened. Other staff members are former college teachers, research workers in State or industrial laboratories, or recent college graduates. Many research workers hold master's or Ph. D. degrees; about three-fourths of the scientists are veterinarians. Iowa State University has appointed some of the laboratory's specialists to its graduate staff.

At the National Animal Disease Laboratory, these Federal scientists form research teams to investigate domestic animal diseases. Such a team may include two or three—or all—of the following: a research veterinarian, a virologist, a bacteriologist, a chemist, a pathologist, and a physiologist. It is possible for team members to work side-by-side in independent investigations of a single disease. More often, several scientists with different specialties attack the same disease problem in a single laboratory animal, and each contributes his findings to a cooperative experiment.

One of the major benefits of this team approach is the exchange of ideas and enthusiasm generated between scientists with different research specialties who are not ordinarily associated.



N–40824

Reception area of administration building.

N–40826

Conference in laboratory auditorium.

WHAT DISEASES WILL BE STUDIED?

Diseases and disease organisms that have national significance or cause serious economic losses are studied at the laboratory. Research projects will include:

Diseases of cattle: Brucellosis, foot rot, enteric diseases (virus diarrhea), infertility and vibriosis, leptospirosis, mastitis, pinkeye (infectious keratitis), respiratory diseases (shipping fever), tuberculosis and paratuberculosis.

Diseases of sheep: Ecthyma (sore mouth), foot rot.

Diseases of swine: Atrophic rhinitis, brucellosis, enteric diseases (transmissible gastroenteritis), hog cholera, leptospirosis, swine erysipelas.

Diseases of poultry: Chronic respiratory disease of poultry (airsacculitis of turkeys), fowl cholera, infectious bronchitis, Newcastle disease, Salmonellosis.

Infectious agents: *Pasteurella,* psittacoid viruses, anaerobic bacteria.

Research Center

The National Animal Disease Laboratory is a complex of 33 fire-resistant buildings, located northeast of Ames. Three research buildings are the heart of the center. The main laboratory contains 32 separate units, all served from a central services core. Only small caged animals will be used in the studies in this building. Two animal isolation laboratory buildings are equipped for the holding of larger farm animals used in experimental work. All other buildings in the center support or reinforce the research: some provide necessary services; others house staff, animals, and equipment.

In the flexible, modern facilities of the National Animal Disease Laboratory, the U.S. Department of Agriculture will continue and expand the animal disease studies formerly conducted at Beltsville, Md., and Washington, D.C.

The laboratory is well equipped. For example, it has an electron microscope, which—for greater accuracy—stands on a foundation built independently from the rest of the building. Photographic equipment includes cameras for ultraviolet-light photographs. Among other modern research tools are high-speed centrifuges, freeze drying apparatus, irradiation equipment, spectrophotometers, an electrophoresis apparatus, ultracentrifuges, and ultrasonic generators.

The center incorporates many built-in safety features to protect both the research workers and the community against accidental spread of disease. All sewage and all air from research areas are decontaminated on the premises. Safety regulations govern routine operations, including movement of workers, animals, equipment, and visitors. These extensive precautions have four purposes:

- To protect research workers from the animal diseases to which man is susceptible.
- To prevent the escape of disease agents from the laboratory to the surrounding community.
- To prevent the introduction of diseases from the community into the disease-free animal colony or into the research areas.

• To prevent cross-contamination between different areas within the laboratory, or between the research areas and the disease-free animal colony.

A perimeter fence outlines the restricted area and protects the research center. Inside this woven-wire fence are:

• The 35-acre compound area, where research laboratories and service buildings are located.

• The 60-acre quarantine area, where disease-free animals are held until needed for research.

• The pastures, where the laboratory's disease-free animals are raised.

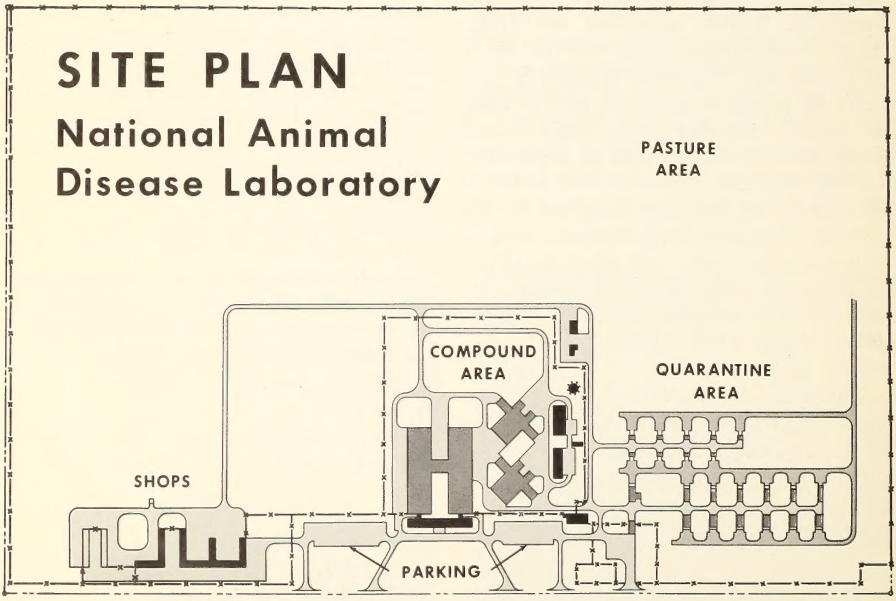
(See site plan below.)

The research and service buildings are open only to authorized personnel. All workers and visitors must enter the administration building or the change house; animals are brought into the center through a receiving barn.

Administration Building

The two-story red brick administration building contains offices of the director, assistant directors, investigational leaders, and administrative staff. It has a scientific library, which is directed by a professional librarian. The conference room, designed for seminars and other scientific meetings, seats 200. Several small rooms are used for mealtime conferences. A main cafeteria is equipped to accommodate 100 people at the same time.

The administration building serves as a gateway to the main laboratory.



Compound, quarantine, and pasture areas of the National Animal Disease Laboratory.

Change House

Another gateway building is the change house. It is divided into two completely separate sections. The north section, which opens into the compound area, serves scientists, animal caretakers, and maintenance men who work in the animal isolation laboratories and service buildings. The south section adjoins the quarantine area. Workers handling diseased animals have no on-the-job contact with their counterparts in the disease-free animal colony. This arrangement prevents accidental spread of disease by humans from contaminated to clean animals.

Dressing rooms containing lockers for street clothes lead to showers, which open into inside dressing rooms. Here workers are supplied prescribed work clothes—gray coveralls for animal caretakers in the quarantine area or tan coveralls for men in transit inside the compound. Each side of the change house contains a lunchroom.

The center's safety plan calls for soap-and-water showers for workers leaving contaminated areas.

The emphasis on safety extends to all materials, supplies, and animals used to study disease. Animals and materials are taken into research areas through air locks. Because this air-lock system is electrically controlled, the outer door cannot be opened until the inner door to the laboratory is sealed, and vice versa. Everything that enters a research area is considered contaminated and—except the scientists themselves—is either sterilized before it leaves or incinerated within the area. Even the air is passed through bacterial filters before it is exhausted. Sewer outlets in each unit contain traps to prevent backflow of bacteria and waste.

N–40801

Team of scientists in research unit of main laboratory.

Main Laboratory

The main laboratory is an H-shaped one-story building located behind the administration building. It has 25 research units and 7 regulatory units. A central services area is located in the crossbar of the H.

In this building, teams of scientists probe into the causes of infectious animal diseases. They study specific bacteria, fungi, viruses, rickettsiae, or pathological conditions. They determine the effect of the causative agents on small animals—guinea pigs, mice, rats, rabbits, hamsters, and ferrets. Research on a disease complex—such as respiratory diseases of cattle—can include bacteriological, virological, serological, pathological, immunological, and animal inoculation studies.

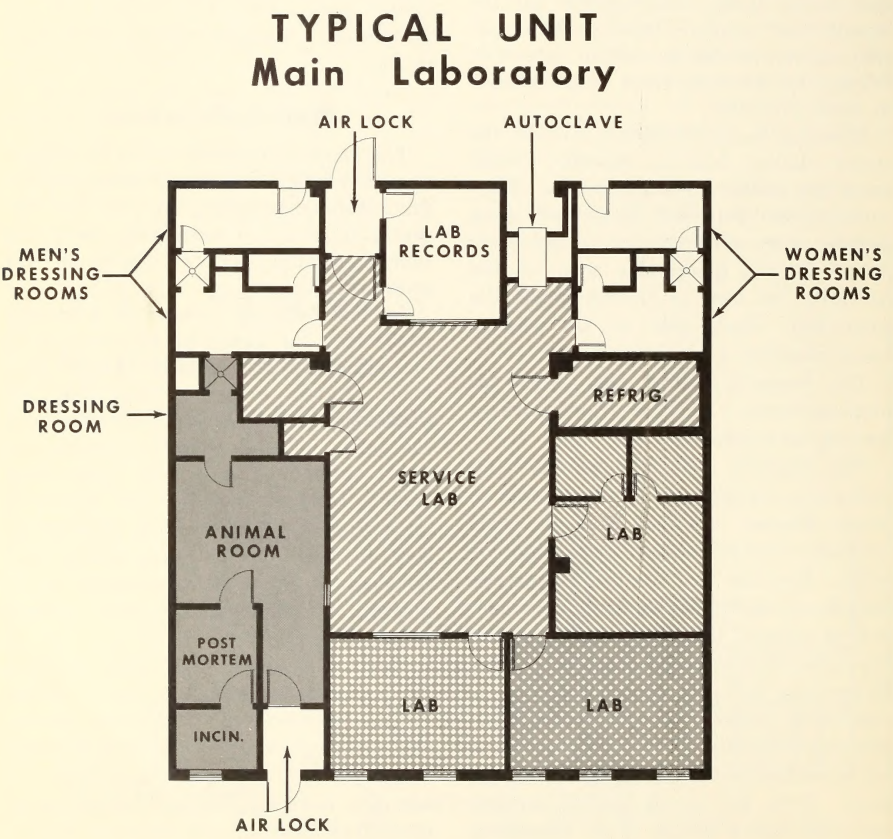
In their research with small animals, the laboratory scientists seek fundamental information about cause, transmission, diagnosis, prevention, treatment, and control of diseases of livestock. A scientific team may move from the main laboratory to an animal isolation laboratory as work progresses.

Research Units

A typical research unit in the main laboratory is 50 by 40 feet. It is completely self-contained to prevent cross-contamination. (See typical unit, main laboratory, below.) Within the unit, live steam, hot water, gas, fuel oil, and electricity are available. Filtered air is brought in at the temperature and humidity needed for research.

Entrances and exits to the unit are separate dressing room-shower-dressing room arrangements for men and women. Supplies and animals are brought in through the air-lock doors.

Each unit has a general service area, surrounded by three basic research rooms, a walk-in refrigerator and incubator room, a gaseous sterilizer, and a record room. Animals used in current



Research unit of the main laboratory, showing air locks, dressing room entrances, and work areas.

N–40804

Loading pamphlets into pass-clave inside research unit for sterilization.

N–40805

Removing "clean" pamphlets from pass-clave in outside hall after overnight treatment.

research are isolated from the general service area. To reach the animal room, scientists must pass through an inside shower and dressing room. When experiments are completed, animals are examined in the post mortem room and disposed of in a small incinerator.

Glazed enamel cement walls, steel doors, resilient tile floors, and other surfaces are designed for easy and frequent cleaning. Steam or hot water is faucet-mixed with detergents or disinfectants and applied under pressure. Units are decontaminated before reuse.

In addition to a small autoclave for research materials, each unit has a large wall autoclave. This opens into the general service area, with a second door on the "clean" corridor outside the unit. Automatic controls prevent the opening of both doors at the same time. All reusable supplies must be treated here before they are removed for routine cleaning. In the autoclave, materials are sterilized with steam or gas, such as ethylene oxide. Decontaminated materials may be removed from the corridor side, if the autoclave door on the other side is locked.

Books and papers presented a special decontamination problem to laboratory planners. They realized these items—if untreated—could carry disease agents and undermine the entire safety system. Their solution: a small autoclave—known as a pass-clave—built into the wall between the record room and the outside corridor. It uses ethylene oxide, a gas that does not harm paper. After overnight treatment, items may be removed from the corridor side of the pass-clave and taken to other parts of the laboratory without danger of spreading disease.

Several of the basic research units have been combined to allow freer cooperation and consultation among scientists who work with uncontaminated materials. For example, the chemistry-physics unit contains 16 basic research rooms for the study of chemical and physical properties of biologic materials.

Principal Research Buil
The National Animal Disease

ings
aboratory

1 Administration Building

2 Main Laboratory

3 Animal Isolation Laboratory

4 Animal Isolation Laboratory

5 Change House

6 Power Plant

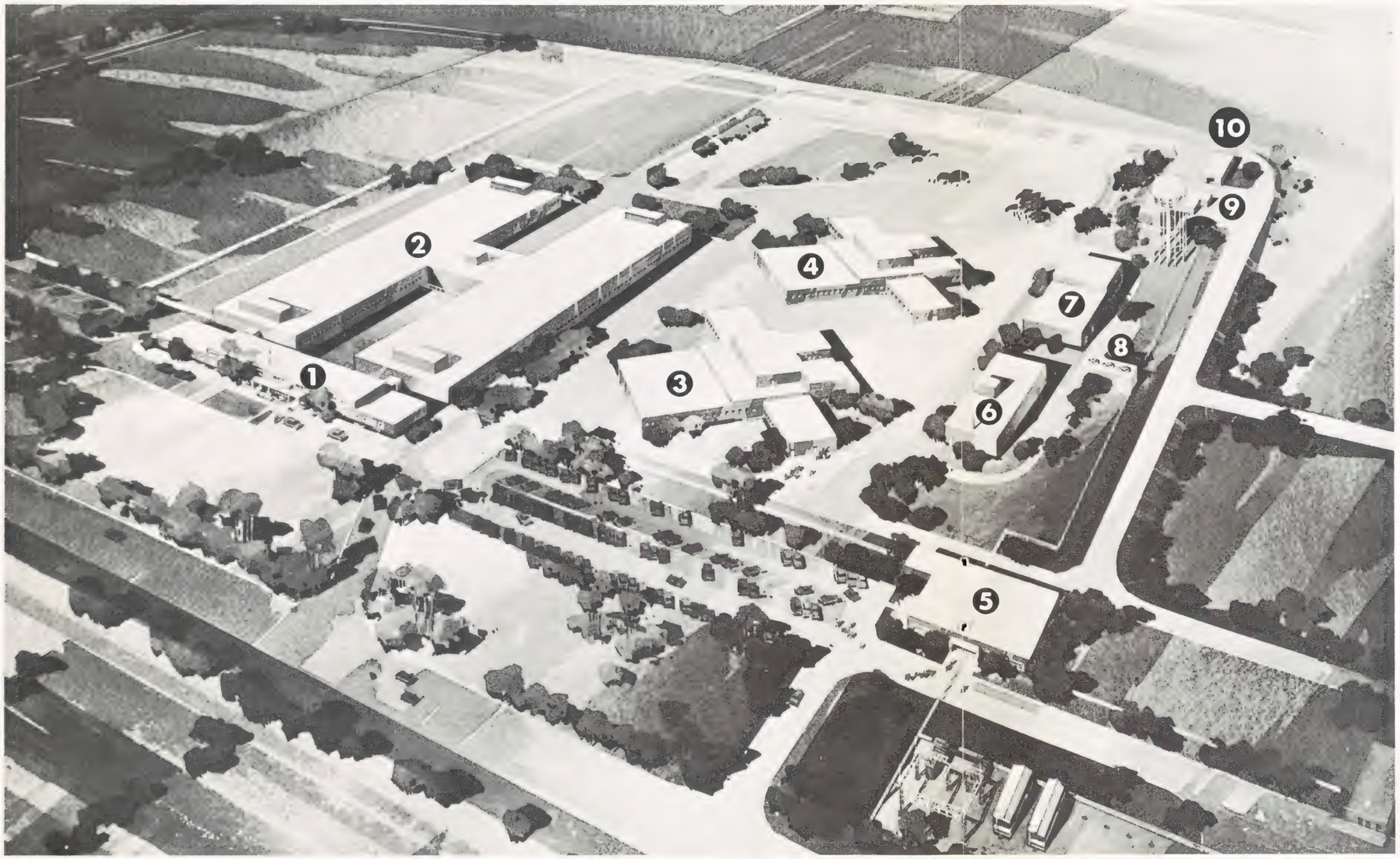
7 Waste Treatment Plant

8 Cooling Tower

9 Post Mortem Building

10 Vehicle Decontamination Building

Principal Research Buildings
The National Animal Disease Laboratory



1 Administration Building

2 Main Laboratory

3 Animal Isolation Laboratory

4 Animal Isolation Laboratory

5 Change House

6 Power Plant

7 Waste Treatment Plant

8 Cooling Tower

9 Post Mortem Building

10 Vehicle Decontamination Building

Scientists can move from room to room within the unit without showering, because infectious material is never handled here.

Units for Regulatory Work

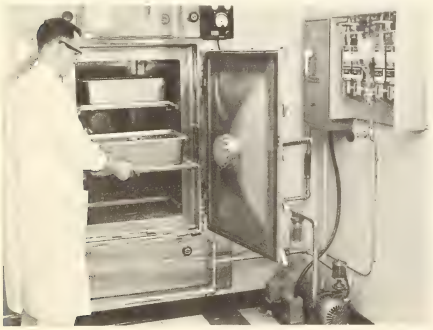
The seven units for regulatory activities contain the same built-in safety features as those for research. In this part of the main laboratory, one group of scientists works to standardize and evaluate animal biologics; another group provides diagnostic services to support Federal animal disease control programs.

For the first time, the Department of Agriculture is able to test a wide variety of veterinary biologics before or after they have left the production plant. These products, which are used to prevent or control disease, are gathered from many sources—warehouses, farms, or regular channels of trade. They are spot checked for safety, purity, and potency at the Ames laboratory. Related studies seek to improve methods for standardizing veterinary biologics.

More than 100 different types of products are marketed by about 65 U.S. firms licensed to produce biologics. Products are carefully tested before licenses are issued, and further tests are conducted during and after production. Although development of modified live-virus vaccines in the 1940's and 1950's created a need for more Federal checking of such products, this service was not previously available.

A pilot plant for the production of veterinary biologics is built into the regulatory area. As improved biological standards, tests, and production methods are developed, they are given trial runs in the pilot plant. Findings that prove practical will be adopted for use in commercial laboratories as well as in the National Animal Disease Laboratory.

Several regulatory units provide diagnostic services for Animal Disease Eradication Division programs. When control workers discover evidence of disease, they send specimens to this laboratory. Diagnoses are routinely conducted for such diseases as tuberculosis, brucellosis, scrapie, and anthrax. Many of the livestock diseases that occur in the United States require differential diagnosis because they resemble dangerous foreign diseases. The staff also supplies brucellosis antigen and tests tuberculin for Federal programs.



N–40806

Loading materials in autoclave for decontamination.

N–40803

Transferring cultures in inoculation booth.

The new laboratory does not duplicate the services of State animal disease diagnostic laboratories, but it does test or type unusual specimens for other laboratories and will provide consultation services to the States. It also trains Federal disease eradication workers in diagnostic procedures.

A team of disease detectives, or epidemiologists, is being formed at the laboratory. These scientists serve the Federal government in emergencies by tracing outbreaks of infectious animal diseases to the source herd or flock, and by identifying exposed livestock.

Central Services

From the central services area flow all of the reusable laboratory supplies needed by research workers. Between 10,000 and 12,000 different items are stocked in its supply rooms. Glassware is available in every standard laboratory shape and size—from 1- by 3-inch microscope slides to petri dishes, to 12-gallon carboys. Rubber gloves, boots, coveralls, and lab jackets are also distributed by central services.

After soiled supplies have been decontaminated in autoclaves, they are brought to the central services area for cleaning. Glassware is washed in a mechanical dishwasher that can be used continuously. Loading racks emerge with chemically clean glassware. Next, racks are moved to one of the large ovens for sterilization. Teams of workers inspect each piece of glass for breakage, cracks, and spots; then it is stored until needed.

Lab jackets, coveralls, and other clothing used by research and regulatory workers in the laboratories are washed and ironed in the central services laundry.

N–40809

Delivering media by autoclave from central services to pilot plant.

The media rooms supply scientists with various types of cultural media and solutions on order.

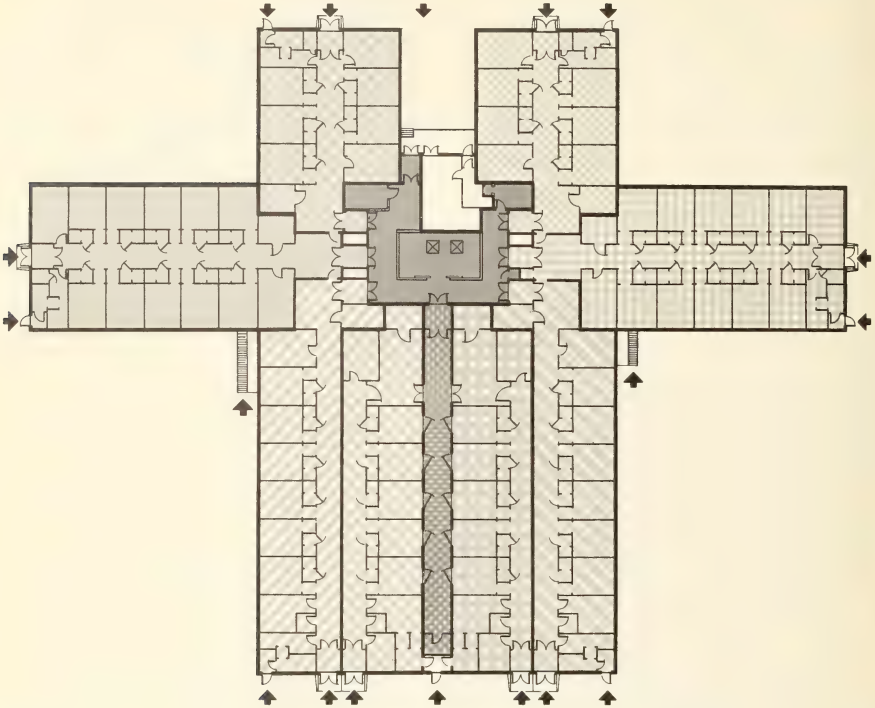
Isolation Laboratories

The animal isolation laboratories—known as buildings 3 and 4—are designed to provide maximum protection for the scientists as well as the residents and livestock of the area that surrounds the Federal center.

Each of the two cross-shaped buildings is completely separate. Inside each building are eight isolated wing zones, or research units, where specific animal diseases are studied. Air locks, dressing room-shower entrances, and other safety devices are used to seal each wing zone away from the others in the same building. (See eight isolation wing zones, p. 12.) This isolation permits scientists to conduct research on highly infectious

EIGHT ISOLATION WING ZONES

Animal Isolation Laboratory



Eight wing zones of an animal isolation laboratory, which are sealed away from each other to protect scientists and the community from the spread of infectious animal diseases.

diseases of farm animals—including those transmissible to man—with safety.

Each isolation wing zone contains a post mortem room, storage room, walk-in refrigerator, small laboratories, and animal isolation rooms. Buildings 3 and 4 have a total of 96 isolation rooms. Ninety-one of these are of standard design. Each room has a filtered air supply and a separate sewage outlet; it provides complete isolation for test animals within the already isolated wing zone.

In addition, building 3 has five special climate-controlled rooms. Temperatures can be set from −30° F. to 110°; with this range, any normal combination of temperature and humidity found in the United States can be duplicated.

Full-scale research projects often call for absolute isolation of animals exposed to disease. Other projects hold a small number of test animals together as a herd or flock. In both situations, the isolation rooms permit the safe use of enough test animals to assure scientists of statistically sound and significant research results.

Walls, floors, and ceilings of the laboratories are smooth concrete surfaces, easily decontaminated with live steam. Doors to isolation rooms are steel. The rooms have showers for workers and individual feed storage bins.

Corridors in each wing zone are served by an overhead monorail that leads to the post mortem rooms and the large incinerator in the central building core. After carcasses are moved by monorail, the corridor is sterilized before reuse. In each building, an incinerator having a capacity of 1,000 pounds per hour is used to dispose of all research animals at the end of the experiments.

Another unit in building 3 has six copper-enclosed rooms for use in work requiring electronic equipment. Shielded walls, floors, and ceilings prevent interference from outside electrical forces during exacting physiological studies, such as the measurement of brain impulses. Research workers can observe test animals in the operating room through an observation window.

Experiments with individual large animals are short term, usually less than 3 months.

Quarantine Area

Disease-free animals are used in research at the Ames laboratory. The animal colony is held in a closely guarded quarantine area, where rigorous precautions are taken to prevent introduction of disease from the surrounding community.

To provide research workers with animals of known pedigree and health, the National Animal Disease Laboratory has its own breeding herds and flocks. These animals—cattle, hogs, poultry, guinea pigs, and rabbits—are from stocks which were maintained disease-free at Beltsville for as long as 30 years. Some animals are purchased from commercial breeders who provide uniform, high quality disease-free stock.

The quarantine area contains 21 holding buildings for animals. These buildings are constructed of sandwich panels of reinforced concrete insulated with plastic foam. Smooth concrete interior surfaces are easily sterilized and cannot be damaged by animals. Large animals are brought to these buildings to be held in quarantine until needed for research.

The mastitis barn, for long-term study of one of the Nation's costliest animal diseases, is located on the north edge of the quarantine area. In this building, veterinarians are investigating the effects

Poultry cages with controlled temperature and humidity in animal isolation laboratory.

of environment, management, and sanitation as they influence mastitis. Other research involves the susceptibility and resistance of individual animals to mastitis; methods by which causative agents enter the animal's body; and the mechanics of infection.

Animals that die in the quarantine area are transported to a small post mortem building, where the cause of death is determined. Then carcasses are burned in an adjoining incinerator. No animals from the research buildings are ever brought to this post mortem building, which is outside the compound.

An area for raising and holding clean animals is located about 1 mile outside the center.

Pastures

About half of the 318 acres in the center is in pastures. This section is located between the compound area and the perimeter fence. Some disease-free animals will be raised here.

Service Buildings

The service buildings are designed for safety as well as efficiency. Standby service systems have been built into the research center, so that routine operations will not be interrupted by equipment failure. Diesel generators are available as an emergency source of electricity.

A resident engineer directs all services required for day-to-day operation of the laboratory's 223,000 square feet of floor space.

The power plant is the center of service and maintenance. An enunciator panel board indicates whether any of the critical services in the laboratory—water and sewage lines, air compressors, lights, fuel oil—are functioning improperly. It also registers temperatures in walk-in refrigerators. Three gas-fired boilers can each produce 43,000 pounds of steam per hour, at 110 pounds of pressure. Two are sufficient to operate the plant; the third is held for reserve use.

The waste treatment plant is the point for collecting, processing, and decontaminating sewage. Before sewage from the laboratory is discharged into the Ames sewerage system, it is chopped into one-fourth inch particles, steam-sterilized to kill bacteria, and cooled.

The laboratory's 150-foot water tower contains a water supply of 500,000 gallons. The normal water supply flows into the Federal center through a 14-inch main.

An 1,800-ton air-conditioning system provides temperature- and humidity-regulated air for the principal buildings. Air brought into the administration building and the main laboratory is washed and filtered to remove dirt, heated or cooled, and then circulated through the intricate air duct system. A delicate balance is maintained, so air flows only from clean to contaminated areas. It is exhausted—never recirculated—after it has been drawn through bacterial filters to remove disease agents. The main laboratory undergoes a continuous change of 160,000 cubic feet of air each minute.

The vehicle decontamination building is used to clean and disinfect trucks when necessary.

The shops are located north of the administration building, in an area outside the compound. The laboratory has machine, electrical, plumbing, sheet metal, carpentry, welding, refrigeration, instrumentation, auto repair, and paint shops. Vehicles also are stored in the building.

N-40934

Modern research tool: electron microscope.

N-40937

Experiment using ultracentrifuge.

Site

The 318-acre tract on which the laboratory is located was deeded by the State of Iowa to the U.S. Government without cost. This site was chosen by a committee of national agricultural leaders, who studied proposals from 90 communities that wanted the research center.

Ames—the home of Iowa State University—was selected as the laboratory site in July 1956. Construction on the $16.5 million research center began in 1958, and the buildings were turned over to the U.S. Government in May 1961. The master plan for the research center provides for expansion.

Tradition of Service

Veterinary agencies of the Department of Agriculture have conducted sound scientific research on national and regional animal-disease problems since 1879. Now—as then—research workers seek fundamental scientific principles and develop practical applications of these principles. After Federal research findings are thoroughly tested, they are made available to all the people of the United States; many of the veterinary discoveries have been patented in the public interest.

The story of the eradication of Texas fever, a fatal disease of cattle, illustrates one of the many contributions of research to the American livestock industry. When the Bureau of Animal Industry was established as the veterinary arm of the Department of Agriculture in 1884, Texas fever was prevalent throughout the south and was spreading north. One of BAI's first challenges was to find the cause of this disease. In 1893, the Government scientists announced a major medical discovery: Texas fever is caused by a blood parasite that is spread by a cattle tick. This knowledge—that an intermediate host could spread an

N—40816

Laboratory executives: (l. to r.), Assistant Director C. A. Manthei, Director William A. Hagan, Division Director Howard W. Johnson.

infectious disease from one animal to another—was a key to the conquest of malaria, yellow fever, typhus, and other insect-borne human and animal diseases. Cattle fever research cost $65,000; it led to eradication of the disease and an annual saving to American farmers of about a thousand times the initial investment.

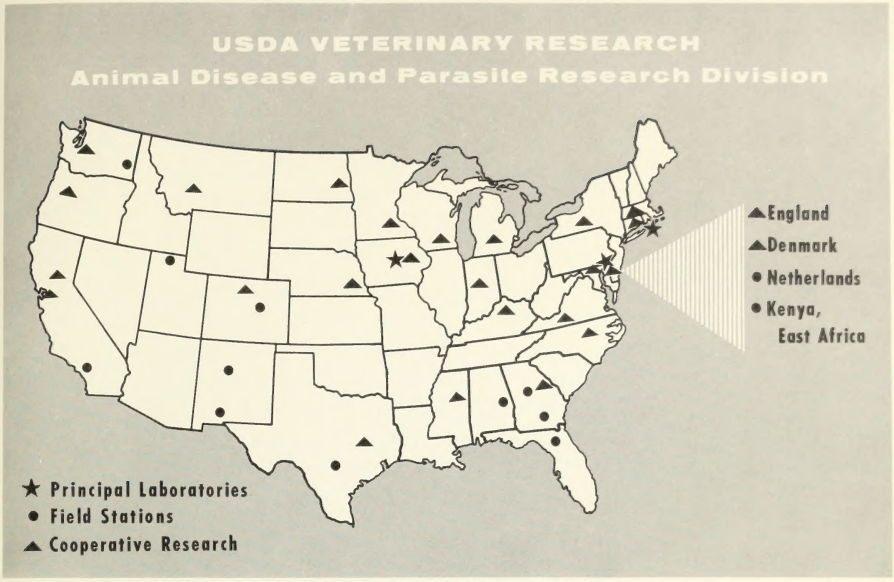
The BAI undertook research on other major animal and parasitic diseases, among them anthrax, blackleg, contagious bovine pleuropneumonia, fowl cholera, and tuberculosis.

Hog cholera research also brought direct benefits to American farmers. After more than 20 years of study, Federal veterinarians found that hog cholera is caused by a virus. With this knowledge, they developed a hyperimmune serum that protects pigs from the often-fatal disease. For many years, simultaneous injections of virus and serum were given to hogs; then a killed-virus vaccine was developed by the Department scientists. Commercial biologics firms introduced improved vaccines in the 1940's. These methods of preventing hog cholera have been significant in the growth of the Nation's swine industry.

Long-term research on brucellosis by Federal scientists led to the isolation of *Brucella suis,* the cause of the disease in swine. Later studies established the relationship between organisms that cause brucellosis in cattle, swine, and goats. After the development of Strain 19 vaccine to protect cattle from brucellosis, a national eradication program was launched. As the brucellosis infection rate in cattle declined, undulant fever—the form of the disease humans get by drinking raw milk from a cow that has brucellosis—has declined significantly.

Federal research workers have traditionally cooperated with State and experiment station scientists in the study of disease. Such cooperation solved—and eliminated—the problem of X-disease, or hyperkeratosis in cattle. In the 1940's, a chemical was added to the grease commonly used to lubricate feed-pelleting machines and sometimes farm machinery. Cattle that were fed pelleted feed containing traces of the chemical became poisoned, and developed thick, horny skin. Research workers in 18 States joined in isolating the cause. With the cooperation of lubricant manufacturers, who stopped using the chemical, the disease virtually disappeared.

Another new disease—vesicular exanthema—has been eradicated from the United States through the application of research. When VE began spreading in 1952, Federal veterinarians discovered that this disease of hogs is spread in contaminated feed, and that heat kills the VE virus. After States passed laws re-



Locations of the United States Department of Agriculture's animal disease research work.

quiring hog producers to cook garbage used for feed, the disease was eradicated.

The USDA's fundamental and applied research on animal diseases has been conducted at Washington, D.C., Bethesda, Md., the Animal Disease Station at Beltsville, Md., and various field stations.

Research has been applied by veterinarians and farmers to improve the health of animals and to reduce disease losses. It has been the basis for eradication programs and the foundation for further disease investigations.

With the reorganization of the Department of Agriculture in 1954, the Animal Disease and Parasite Research Division was assigned the basic function of investigating all animal diseases. The Ames laboratory is an extension of this assignment. In initiating vital research in the modern research center, the Federal Government will augment—not replace—the valuable animal-disease work of State and private laboratories.

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Prepared by

Animal Disease and Parasite Research Division

Agricultural Research Service

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Growth Through Agricultural Progress

Tomorrow's Research

At the National Animal Disease Laboratory, highly trained research workers are being challenged to contribute fundamental and applied knowledge in many areas—to find more basic information about the agents that cause disease, to discover more about natural immunity and susceptibility of animals, to learn how specific diseases are produced within the animal's body, and to apply current knowledge to the improvement of immunization, prevention, treatment, and eradication of animal diseases.

As these problems are solved, others will be studied. The laboratory's flexible design permits initiation of research on a variety of subjects involving new techniques and instrumentation when desirable. And there is no shortage of subjects needing investigation—at least 100 infectious diseases of cattle, swine, poultry, and other livestock are prevalent in the United States.

The research worker has entered a new era in the science of living things. He is applying modern techniques to the study of long-established diseases, and is building up research data for use against disease problems that are certain to arise in the future. His work will open new scientific horizons, just as the early research on Texas fever did.

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